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10/587,691	07/27/2006	Hannes P. Hofmann	EFFEP0101US	7045

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EXAMINER	
NGUYEN, HUNG D	
ART UNIT	PAPER NUMBER
3742	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/587,691	HOFMANN, HANNES P.	
	Examiner	Art Unit	
	HUNG NGUYEN	3742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/12/2007, 3/26/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-16 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konrad et al. (US Pub. 2002/0129972) in view of Tamm (US Pat. 5,666,722).

3. Regarding claim 1, Konrad et al. discloses a structure having laser ablated features and method of fabricating comprising the following step:

a) Providing a printed circuit board 1 (Fig. 1);

b) Coating the circuit board on at least one side thereof with a dielectric 2 (Fig. 1a) (Par. 25);

c) Structuring the dielectric for producing a trenches 3 (Fig. 1b) using laser ablation (Par. 30), the trenches not extending completely through the dielectric (See Fig. 1b, the trench did not extending through layer 2);

d) Depositing the primer layer into the produced trenches and vias only (Par. 33);

e) Depositing a metal layer 5 (Fig. 1d) onto the primer layer, with the trenches and vias being completely filled with metal for forming conductor structures therein (Par. 37);

f) Removing the metal layer and the primer layer, except for in the trenches and vias, to expose the dielectric if the primer layer has been deposited onto the entire surface in method step d).

except for the structuring the dielectric for producing vias using laser ablation in step c. Tamm teaches a method of manufacturing printed circuit board where a through hole 2a (Fig. 1c) is produce by laser ablation (Col. 4, Lines 34-36). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the structuring the dielectric for producing vias using laser ablation in step c, for the purpose of connecting the two layers.

4. Regarding claim 2, Konrad et al. discloses all the claimed features as set forth above except for the trenches and vias are produced in one single process operation in method step c. Tamm teaches a method of manufacturing printed circuit board where the trenches 2, 3, and 4 (Fig. 1c) and vias 2a (Fig. 1c) are produced in one single process operation (Col. 2, Lines 15-19; Col. 6, Lines 45-47). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the trenches and vias are produced in one single process operation in method step c, for the purpose simplifying the process making a printed circuit board.

5. Regarding claim 3 and 20, Konrad et al. discloses all the claimed features as set forth above except for the trenches and vias are produced using a direct-write technique in method step c. Tamm teaches a method of manufacturing printed circuit board

where the trenches and vias are performed by a laser ablation with direct-writing technique (Col. 4, Lines 50-54; Col. 6, Lines 17-24). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the trenches and vias are produced using a direct-write technique in method step c, for the purpose of controlling the energy density of the radiation thereby trenches and vias can be produced simultaneously.

6. Regarding claim 4, Konrad et al. discloses all the claimed features as set forth above except for the direct-write technique comprises scanning a laser beam across the dielectric at those surface regions of the dielectric in which the trenches and vias are to be produced. Tamm teaches a method of manufacturing printed circuit board where the direct-write technique comprises scanning a laser beam across the dielectric at those surface regions of the dielectric in which the trenches and vias are to be produced (Col. 6, Lines 17-45). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the direct-write technique comprises scanning a laser beam across the dielectric at those surface regions of the dielectric in which the trenches and vias are to be produced, for the purpose of producing the trenches and vias for the circuit board.

7. Regarding claims 5 and 18, Konrad et al. discloses all the claimed features as set forth above except for the direct-write technique further comprises adjusting the power of the laser beam to depend on the depth of the trenches and vias to be produced. Tamm teaches a method of manufacturing printed circuit board which adjusting the power of the laser beam to depend on the depth of the trenches and vias

to be produced (Col. 3, Lines 38-40; Col. 6, Lines 45-47). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the direct-write technique further comprises adjusting the power of the laser beam to depend on the depth of the trenches and vias to be produced, for the purpose of producing the trenches and vias for the circuit board.

8. Regarding claim 6, Konrad et al. discloses all the claimed features as set forth above except for the direct-write technique further comprises pulsing the laser beam. Tamm teaches a method of manufacturing printed circuit board where the direct-write technique further comprises pulsing the laser beam (Col. 3, Lines 29-33). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the direct-write technique further comprises pulsing the laser beam, for the purpose of producing the trenches and vias for the circuit board.

9. Regarding claim 7, Konrad et al. discloses all the claimed features as set forth above except for the direct-write technique further comprises adjusting the energy amount of the laser beam irradiated to a surface area of the dielectric to depend on the depth of the trenches and vias to be produced by setting the number of laser pulses being irradiated to said surface area. Tamm teaches a method of manufacturing printed circuit board where adjusting the energy amount of the laser beam irradiated to a surface area of the dielectric to depend on the depth of the trenches and vias to be produced by setting the number of laser pulses being irradiated to said surface area

(Col. 3, Line 38-43). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the direct-write technique further comprises adjusting the energy amount of the laser beam irradiated to a surface area of the dielectric to depend on the depth of the trenches and vias to be produced by setting the number of laser pulses being irradiated to said surface area, for the purpose of producing the trenches and vias for the circuit board.

10. Regarding claims 8 and 22, Konrad et al. discloses all the claimed features as set forth above except for the direct-write technique further comprises decreasing the energy amount of successive energy pulses being irradiated to a surface area of the dielectric. Tamm teaches a method of manufacturing printed circuit board where the direct-write technique further comprises decreasing the energy amount of successive energy pulses being irradiated to a surface area of the dielectric (Col. 3, Line 38-43). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the direct-write technique further comprises decreasing the energy amount of successive energy pulses being irradiated to a surface area of the dielectric, for the purpose of producing the trenches and vias for the circuit board.

11. Regarding claim 9, Konrad et al. discloses all the claimed features as set forth above except for the trenches and vias are connected to each other in a landless design. Tamm teaches a method of manufacturing printed circuit board where the trenches are connected to another trenches in different layers for multilayer board (Fig.

1f). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the trenches and vias are connected to each other in a landless design, for the purpose of connecting the trenches in different layers.

12. Regarding claim 10, Konrad et al. discloses all the claimed features as set forth above except for further method steps are performed once or several times after method step f):

g) Depositing another dielectric onto the dielectric being provided with trenches and vias; and

h) Repeating the steps c through f.

Tamm teaches a method of manufacturing printed circuit board where further method steps are performed once or several times after method step f: Depositing another dielectric onto the dielectric being provided with trenches and vias; and repeating the steps c through f (Fig. 1g; Col. 4, Lines 42-49). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the further method steps are performed once or several times after method step f): depositing another dielectric onto the dielectric being provided with trenches and vias; and repeating the steps c through f, for the purpose of making multi-layer printed circuit board.

13. Regarding claims 11 and 19, Konrad et al. further discloses a terminating layer 6 (Fig. 1e) is deposited after any one of method steps f or h (Par. 38).

14. Regarding claim 12, Konrad et al. further discloses the primer layer is deposited by sputtering method (Par. 34-35).

15. Regarding claim 13, Konrad et al. further discloses the metal layer is formed by electroless plating (Par. 37).

16. Regarding claim 14, Konrad et al. further discloses the metal layer and the primer layer are removed by polishing (Par. 34).

17. Regarding claim 15, Konrad et al. discloses all the claimed features as set forth above except for producing trenches and vias in the dielectric in method step c comprises producing trenches, said trenches also comprising vias. Tamm teaches a method of manufacturing printed circuit board where the trenches also comprising vias (Fig. 1b-1c). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to producing trenches and vias in the dielectric in method step c comprises producing trenches, said trenches also comprising vias, for the purpose of connecting trenches in different layers.

18. Regarding claim 16, Konrad et al. further discloses functional layers are deposited onto the metal layer for electrically contacting electric components (Par. 49).

19. Regarding claim 21, Konrad et al. discloses all the claimed features as set forth above except the printed circuit board is a multilayer circuit board comprising two sides and a conductor pattern on each side. Tamm teaches a method of manufacturing printed circuit board where the printed circuit board is a multilayer circuit board comprising two sides and a conductor pattern on each side (Fig. 1a-1f). (Col. 4, Lines

32-35). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in Konrad et al. the teaching of Tamm in order to have the printed circuit board is a multilayer circuit board comprising two sides and a conductor pattern on each side, for the purpose of producing multi-layer board.

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Konrad et al. (US Pub. 2002/0129972) in view of Tamm (US Pat. 5,666,722) and further view of Yokogawa et al. (US Pat. 6,740,416).

21. Regarding claim 17, Konrad et al. discloses all the claimed features as set forth above except for the circuit carrier is manufactured in a horizontal line. Yokogawa et al. teaches aerogel substrate and method for preparing the same where the circuit carrier is manufactured in a horizontal line (Col. 18, Line 53 to Col. 19, Lines 8). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize in the combined references the teaching of Yokogawa et al. in order to have the circuit carrier is manufactured in a horizontal line, for the purpose of simplifying the process of manufacture the printed circuit board.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG NGUYEN whose telephone number is (571)270-7828. The examiner can normally be reached on Monday-Friday, 8:30AM-6PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu Hoang can be reached on (571)272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HUNG NGUYEN/
Examiner, Art Unit 3742

/TU B HOANG/
Supervisory Patent Examiner, Art Unit 3742